

MAMM CREEK – COMPARISON OF EPA AND COGCC SUGGESTED APPROACHES

Key Issue	EPA Recommendation	Currently Being Implemented by COGCC (A10E Pad COA)	¹ Option E From COGCC Options Matrix
Surface Casing Depth Determination for New Wells	Ex. 5 - Deliberative Process	<u>COA #2</u> Surface casing depth is set at minimum 10% of total depth <u>COA #3</u> Surface casing depth is set at a minimum 15% or 500' below water well within a one mile radius (whichever is greater) <u>COA #4</u> Surface casing is set 50' below deepest water well within 1-mile radius adjusted for elevation <u>COA #13</u> Set surface casing 50' below Molina member of Wasatch Fm	Surface casing would be set at least 200' below the deepest water well within 1 mile, but it would not be subject to a % of TVD requirement.
		<div style="text-align: center; background-color: black; color: white; padding: 2px;">DRAFT</div> Fresh water drilling mud must be utilized during the drilling of the surface casing interval, as opposed to water only. Mud that has been used to drill a production interval may not be reused to drill another surface interval.	
Key Issue	EPA Recommendation	Currently Being Implemented by COGCC (A10E Pad COA)	¹ Option E From COGCC Options Matrix
Intermediate Casing Depth Determination	Ex. 5 - Deliberative Process	<u>COA #3</u> If well fails FIT then set intermediate casing 50' below the top of Mesa Verde the cement at least	Establish new requirements for less surface casing and require installation of intermediate casing. Surface casing

for New Wells	Ex. 5 - Deliberative Process	<p>500' top of intermediate casing shoe <u>COA #18</u></p> <p>Utilize intermediate casing if the FIT fails or if the surface casing requires perforation and cement squeezing (#18 means the operator is already required to size the surface casing hole to accommodate intermediate casing if it is necessary)</p>	would be set at least 200' below the deepest water well within 1 mile, but it would not be subject to a % of TVD requirement. For protection from downhole kicks, require intermediate casing on all wells to a depth of approximately 50' below the top of the Mesaverde Formation.
Production Casing Cement for New Wells	Ex. 5 - Deliberative Process	<p><u>COA #11</u></p> <p>If lost circulation of 100+ bbls within 24 hr or major gas (gas over 1800 units while drilling) occurs at a true vertical depth less than 4200', operator shall notify COGCC's western Colorado engineering supervisor within 24 hours, and prior to running casing, to discuss the options for</p> <p>DRAFT</p> <p>casing.</p> <p><u>COA #12</u></p> <p>Production casing cement top must be 500' above the shallowest gas signature observed on mud logs or open hole logs. Depth of the shallowest gas signature, as defined by 2500 units, shall be reported on the request to complete.</p>	Production casing cement more effectively isolates Williams Fork gas due to use of intermediate casing and cement.

¹ Mamm Creek Field Casing and Cementing Guidance Matrix, COGCC September 19, 2011 Memorandum of Response to June 20, 2011 East Mamm Creek Project Drilling and Cementing Study

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Remediation of existing wells with casing/ cement concerns	Ex. 5 - Deliberative Process	Narrative recommendations indicate that COGCC is only requiring remedial cementing of previously constructed wells in cases where venting does not successfully reduce bradenhead pressure or flow (it should be noted that they may require remedial cementing at new wells for problems that occur during the well construction process)	N/A Options address only construction of new wells

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